

Remarks:

Examiner's Position

The Examiner admits that the outstanding rejections have been overcome by the Applicant's amendment. The Examiner issued new grounds of rejection. These grounds are as follows:

Disposition of the Claims

The Examiner has rejected Claim 25 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Examiner stated that there is insufficient antecedent basis for the limitation "the stabilized polyalkenyl sulfonic acid." Claim 24, from which Claim 25 depends, has been amended to include the limitation "the stabilized polyalkenyl sulfonic acid." Support for the amendment is found at p. 20, lines 13-14. Accordingly, Applicants submit that there is sufficient antecedent basis for the limitation "the stabilized polyalkenyl sulfonic acid."

The Examiner has rejected Claim 24 under 35 U.S.C. 102(e) as being anticipated by Carrick, U.S. PG Pub. No. 2003/0134756.

The Examiner has rejected Claims 1-22, under 35 U.S.C. 103(a) as being unpatentable over Hutchings (U.S. Patent No. 3,076,841) in view of Harrison (WO 01/70830) and Nicolet (U.S. Patent No. 4,321,214).

The Examiner has rejected Claim 23 under 35 U.S.C. 103(a) as being unpatentable over Hutchings in view of Harrison and Nicolet as applied to Claims 1-22 above, and further in view of Gragson (U.S. Patent No. 3,384,585).

The Examiner has rejected Claim 25 under 35 U.S.C. 103(a) as being unpatentable over Carrick in view of Hutchings.

The Examiner has rejected Claim 26 under 35 U.S.C. 103(a) as being unpatentable over Carrick in view of Harrison.

The Examiner has rejected Claim 27 under 35 U.S.C. 103(a) as being unpatentable over Carrick in view of Gragson.

Summary of the Invention

Before considering the art rejection, Applicants will briefly review the present invention.

Applicants have discovered an improved process for making polyalkenyl sulfonic acids and the corresponding overbased sulfonates. In particular, the Applicants' invention employs a polyalkenyl sulfonic acid treatment step. This step treats the reaction product and by-products of polyalkene and sulfur trioxide (i.e., polyalkenyl sulfonic acid, sulfuric acid, recovered polyalkene sulfones, and sulfur trioxide) prior to the polyalkenyl sulfonic acid being overbased in a subsequent reaction. The treatment step stabilizes the polyalkenyl sulfonic acid product and by-products by neutralizing the acid with a neutralizing agent, such as an alkaline earth metal hydroxide. This treatment step takes place within a narrow range of time (i.e., between 2 seconds and one hour) and before further processing the polyalkenyl sulfonic acid.

After the polyalkenyl sulfonic acid product has been neutralized, it is either stored for further processing (i.e., overbasing) or immediately further processed (i.e., overbasing). In a separate step, the "neutralized" polyalkenyl sulfonic acid is overbased with an alkaline earth metal compound.

One notable aspect about the present invention is the treatment step. In essence, the treatment step may be seen as an overbasing pre-treatment step that prepares the sulfonic acid for overbasing. The inventors have discovered that the quantity of sulfonic acid, which is the product of the polyalkylene SO_3 reaction, increases when this pre-treatment step is employed. As a result of this pre-treatment step, there is an increased yield of PIB sulfonic acid which thereby results in an increased yield of sulfonate, which is the product of the overbasing step.

This invention solves the problem of lower molecular weight PIB sulfonic acids and sultones that form from the sulfonic acid reaction. The inventors have discovered a process for increasing the yield of PIB sulfonic acids and a process for decreasing sultone formation.

35 U.S.C. §112 Rejection of Claim 25

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §112 rejection of Claim 25 as being indefinite. The Examiner indicated that there was improper antecedent basis for the limitation "stabilized" polyalkenyl sulfonic acid. Claims 24 and 25 have been amended to include the aforementioned limitation: "stabilized" polyalkenyl sulfonic acid. Support for the amendment is found at p. 20, lines 13-14 of the Applicants' Specification. As presently claimed,

Applicants believe that there is sufficient antecedent basis for the limitation "stabilized" polyalkenyl sulfonic acid.

35 U.S.C. §102(e) Rejection of Claim 24

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §102(e) rejection of Claim 24 as being anticipated by Carrick, U.S. Published Patent Application 2003/0134756 ('756 Published Patent Application).

In order for a patent application to be deemed unpatentable under 35 U.S.C. §102(e), the Examiner has the burden of establishing that the Applicants' invention is anticipated in view of the cited reference(s).

In accordance with 35 U.S.C. §102(e), the Examiner must prove that the reference contains all of the elements of the claim(s) when establishing a prima facie case of anticipation. See *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1379 (1986). "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP § 2131 citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." MPEP § 2131 citing *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Applicants respectfully traverse the Examiner's rejection. It is respectfully submitted that the Examiner has failed to show that the '756 Published Patent Application discloses each and every element in Claim 24. Furthermore, it is submitted that the '756 Published Patent Application fails to show the Applicants' invention in as complete detail as is contained in the claim.

As presently claimed, Claim 24 teaches a process for overbasing stabilized polyalkenyl sulfonic acids consisting essentially of overbasing the stabilized polyalkenyl sulfonic acid with an alkaline earth metal basic salt and wherein water is used as a promoter. The stabilized polyalkenyl sulfonic acid has been neutralized with a neutralizing agent prior to the overbasing step.

By contrast, the '756 Published Patent Application does not teach a step wherein the polyalkenyl sulfonic acid product is neutralized. Paragraph [0026] of the '756 Published Patent Application specifically teaches an overbasing process that entails reacting an acidic organic compound in a reaction medium, an excess of metal base and a promoter. The acidic organic compound is defined as a sulfonic acid. There is nothing in Carrick that teaches, or even suggests, that the sulfonic acid has been pre-treated with a neutralizing agent.

Accordingly, the Examiner has failed to show that each and every element of Claim 24 of the presently claimed invention is taught in the '756 Published Patent Application. Applicants respectfully request that the Examiner withdraw the rejection of Claim 24 under 35 U.S.C. §102(e) in view of Carrick, U.S. Published Patent Application 2003/0134756.

35 U.S.C. §103(a) Rejection of Claims 1-22

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of Claims 1-22 as being unpatentable over Hutchings, U.S. Patent No. 3,076,841 in view of Harrison (WO 01/70830) and Nicolet, U.S. Patent No. 4,321,214.

Applicants respectfully traverse the Examiner's rejection. In order for a patent application to be deemed unpatentable under 35 U.S.C. §103(a), the Examiner

has the burden of establishing that the Applicants' invention would be obvious in view of the cited reference(s).

In accordance with 35 U.S.C. §103(a), the Examiner must adhere to the factual inquiries that were established in *Graham v. Deere*. In order to determine obviousness, the Examiner must apply and adhere to the following:

- (a) Determine the scope of the contents of the prior art.
- (b) Ascertain the differences between the prior art and the claims at issue.
- (c) Resolve the level of ordinary skill in the pertinent art.
- (d) Consider objective evidence present in the application indicating obviousness or nonobviousness.

Respectfully, the Examiner has failed to establish a prima facie case of obviousness.

Specifically the Examiner has failed to consider the objective evidence present in the application, which clearly indicates that the presently claimed invention is *not* obvious and is patentable over Hutchings, in view of Harrison and Nicolet.

With respect to Hutchings, this reference teaches that the sulfonic acids are derived from "the sulfonation of petroleum hydrocarbons and fractions of petroleum hydrocarbons." See column 2, lines 49-52. Hutchings further points out that an "oil feed . . . that has been passed through a drier . . . to remove traces of water" is sent to a sulfonator." See column 3, lines 1-24. The oil feed is further reacted with sulfur-trioxide to produce a petroleum sulfonic acid product. See column 3, lines 24-51. Next, the sulfonic acid is, in essence, overbased with

barium oxide to form a mixture of barium sulfonate (i.e., the product of overbasing) and unreacted oil. See column 3, line 51-75 and column 4, lines 1-7.

Although the Hutchings reference teaches a method of preparing a sulfonate, the Hutchings reference fails to teach the method employed in the presently claimed invention. Hutchings does not disclose a sulfonic acid that is derived from a polyalkylene compound. And, the Hutchings reference does not disclose a method of increasing the production of sulfonic acid, which method employs a pre-treatment neutralizing step. Hutchings merely teaches that the sulfonic acid, which is derived from an oil feed, is overbased with barium oxide to form barium sulfonate. The Examiner suggests that there is a separate neutralization and a separate overbasing step. However, the Examiner fails to specifically point out where these two, separate steps are employed in Hutchings.

By contrast, the presently claimed invention employs two separate steps and two different base materials. The first material is used to increase the yield of sulfonic acid and to decrease the amount of sultones in the reaction product. And, the second material is used to overbase the sulfonic acid. As mentioned previously, Hutchings does not teach or suggest that the sulfonic acid is reacted with two separate base materials to (1) increase sulfonic acid yield and decrease sultone formation and to (2) overbase the neutralized sulfonic acid product.

With respect to Harrison, this reference fails to cure the defects of the Hutchings reference. As disclosed at p. 5, lines 9-18, the invention in Harrison is directed to a method of preparing metal sulfonates. The sulfonates are prepared from sulfonic acids that are derived from polyalkylenes, preferably polyisobutene. However, unlike the presently claimed invention, the sulfonic acids are not treated before the overbasing step. As a result of not treating the sulfonic acid,

the yield of sulfonic acid was less than the yield when the sulfonic acid was treated prior to overbasing.

Examples 2 and 2A in the Applicants' Specification depict the difference in sulfonic acid yield for sulfonic acid that has been treated and sulfonic acid that has not been treated. Example 2 of the Applicants' Specification discloses a process wherein the sulfonic acid product was treated with a neutralizing agent prior to overbasing. The yield of sulfonic acid was 69.3%. By contrast, Comparative Example 2A, which uses the method of Harrison, does not employ a neutralization step prior to overbasing. The yield of sulfonic acid was 55.6 wt%. Clearly, this quick step of neutralizing the sulfonic acid increases the yield of sulfonic acid which will be reacted with an overbasing agent to make a sulfonate.

With respect to Nicolet, this reference fails to cure the defects of the Hutchings reference and the defects of the Harrison reference. Specifically, the invention in Nicolet is directed to a process for producing . . . pure oil soluble hydrocarbon sulfonic acid. See column 1, lines 55-56. The process employed in Nicolet comprises "washing the crude sulfonic acid with calcium carbonate to *selectively neutralize and remove sulfuric acid* impurities remaining in the organic sulfonic acid phase." See column 3, lines 5-7. Nicolet further states that "[t]he **sulfonic acid** in the organic phase **remains** essentially **unneutralized**." See column 3, lines 44-45.

Because the sulfonic acid is not neutralized and the sulfonic acid in the presently claimed invention is neutralized, clearly Nicolet teaches away from the presently claimed invention. The neutralization step is clearly not obvious in view of Nicolet.

Applicants assert that the Examiner has failed to establish a prima facie case of obviousness. Claims 1-22 of the presently claimed invention are not taught or suggested in Hutchings, U.S. Patent No. 3,076,841) in view of Harrison (WO 01/70830) and Nicolet, U.S. Patent No. 4,321,214.

There is no likelihood of success in obtaining the presently claimed invention based upon Hutchings, Harrison and Nicolet; and there is no motivation in the references to neutralize the sulfonic acid and overbase the sulfonic acid according to the method employed in the presently claimed invention. Applicants respectfully request that the Examiner withdraw the rejection of Claims 1-22 as being unpatentable over Hutchings, U.S. Patent No. 3,076,841 in view of Harrison (WO 01/70830) and Nicolet, U.S. Patent No. 4,321,214.

35 U.S.C. §103(a) Rejection of Claim 23

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of Claim 23 as being unpatentable over Hutchings, U.S. Patent No. 3,076,841) in view of Harrison (WO 01/70830) and Nicolet, U.S. Patent No. 4,321,214 as applied to Claims 1-22 and further in view of Gragson, U.S. Patent No. 3,384,585.

Applicants respectfully traverse the Examiner's rejection of Claim 23 in view of the aforementioned references. Applicants assert that the Gragson reference fails to cure the defects of Hutchings, Harrison and Nicolet.

The Examiner states that Gragson employs an overbasing pressure that lies within the range of the presently claimed invention (Claim 23). Applicants assert that Gragson in view of Hutchings, Harrison and Nicolet all fail to teach each and every element of the presently claimed invention. Specifically, Gragson teaches

an overbasing process. "When a sulfonic acid is neutralized with a hydroxide or oxide of a base metal to form a sulfonate, the resulting product has an alkaline reserve" (i.e., overbased product). See column 1, lines 67-72 and column 2, lines 29-36). Unlike the presently claimed invention, the sulfonic acid in Gragson that is overbased is a petroleum sulfonic acid (see column 2, lines 34-36). The sulfonic acid employed in the presently claimed invention is a polyalkylene sulfonic acid.

There is nothing in the Gragson reference that teaches or suggests a pre-overbasing step of treating the polyalkylene sulfonic acid. Nor is there any disclosure within Gragson that teaches or suggests that overbased sulfonic acid is derived from a polyalkylene sulfonic acid. Gragson merely discloses a pressure range for overbasing a petroleum sulfonic acid compound.

There is no likelihood of success in obtaining the presently claimed invention based upon Hutchings, Harrison, Nicolet and Gragson; and there is no motivation in the references to neutralize the sulfonic acid and overbase the sulfonic acid according to the method employed in the presently claimed invention. Applicants respectfully request that the Examiner withdraw the rejection of Claims 1-22 as being unpatentable over Hutchings, U.S. Patent No. 3,076,841 in view of Harrison (WO 01/70830), Nicolet, U.S. Patent No. 4,321,214 and in view of Gragson, U.S. Patent No. 3,384,585.

35 U.S.C. §103(a) Rejection of Claim 25

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of Claim 25 as being unpatentable over Carrick in view of Hutchings.

Applicants respectfully traverse the Examiner's rejection. In order for a patent application to be deemed unpatentable under 35 U.S.C. §103(a), the Examiner has the burden of establishing that the Applicants' invention would be obvious in view of the cited reference(s).

Specifically the Examiner has failed to consider the objective evidence present in the application, which clearly indicates that the presently claimed invention is *not* obvious and is patentable over Carrick in view of Hutchings.

As presently claimed, Claim 25 is directed to a process for overbasing stabilized polyalkenyl sulfonic acids consisting essentially of overbasing the stabilized polyalkenyl sulfonic acid with an alkaline earth metal basic salt and wherein water is used as a promoter. The amount of water employed is from about 0.5 to about 8.0 wt% of the polyalkenyl sulfonic acid. The stabilized polyalkenyl sulfonic acid has been neutralized with a neutralizing agent prior to the overbasing step.

By contrast, Carrick does not teach a step wherein the polyalkenyl sulfonic acid product is neutralized. Paragraph [0026] specifically teaches an overbasing process that entails reacting an acidic organic compound in a reaction medium, an excess of metal base and a promoter. The acidic organic compound is defined as a sulfonic acid. Carrick merely teaches an overbasing step.

The Examiner admits that Carrick fails to disclose an amount of water used in the overbasing process. The Examiner relies upon Hutchings to teach an amount of water employed in the overbasing process.

Applicants argue that the Examiner has failed to show that Hutchings cures the defects of Carrick, including the neutralization treatment step employed prior to the overbasing step. Furthermore, the combination of the references would not result in the presently claimed invention. Specifically, the sulfonic acid overbased in Hutchings is a sulfonic acid derived from a "dry oil." See column 3, lines 24-30. By contrast the sulfonic acids employed in Carrick are mono- or polynuclear aromatic or cycloaliphatic compounds. Also, unlike the compounds in Hutchings, the sulfonic acid compounds in Carrick are not dried. And, unlike the compounds of the presently claimed invention, there is nothing in Carrick or Hutchings or the combination of the two references that teaches or suggests that a polyalkenyl sulfonic acid compound has been pre-treated with a neutralizing agent prior to the overbasing step.

Furthermore, there is nothing in Hutchings that teaches or suggests that the amount of water employed in the overbasing step may be used in the Carrick process. There is nothing in the references that teaches or suggests that the combination of the two references would yield the presently claimed invention.

Clearly, the Examiner has failed establish a prima facie case of obviousness. There is no likelihood of success in obtaining the presently claimed invention based upon Hutchings, Harrison, Nicolet and Gragson; and there is no motivation in the references to neutralize the sulfonic acid and overbase the sulfonic acid according to the method employed in the presently claimed invention. Applicants respectfully request that the Examiner withdraw the rejection of Claim 25 as being unpatentable over Carrick, U.S. Published Patent Application 2003/0134756, in view of Hutchings, U.S. Patent No. 3,076,841.

35 U.S.C. §103(a) Rejection of Claim 26

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of Claim 26 as being unpatentable over Carrick in view of Harrison.

Applicants respectfully traverse the Examiner's rejection. In order for a patent application to be deemed unpatentable under 35 U.S.C. §103(a), the Examiner has the burden of establishing that the Applicants' invention would be obvious in view of the cited reference(s).

Specifically the Examiner has failed to consider the objective evidence present in the application, which clearly indicates that the presently claimed invention is *not* obvious and is patentable over Carrick in view of Harrison.

As presently claimed, Claim 26 is directed to a process for overbasing wherein the overbasing temperature is from 100°C to about 170°C. The pre-treated polyalkenyl sulfonic acid is overbased at this temperature.

By contrast, Carrick does not teach a step wherein the polyalkenyl sulfonic acid product is neutralized. Paragraph [0026] specifically teaches an overbasing process that entails reacting an acidic organic compound in a reaction medium, an excess of metal base and a promoter. The acidic organic compound is defined as a sulfonic acid. Carrick merely teaches an overbasing step.

Furthermore, the Examiner admits that Carrick fails to disclose a preferred overbasing temperature. The Examiner relies upon Harrison to teach a preferred overbasing temperature.

Applicants argue that the Examiner has failed to show that Harrison cures the defects of Carrick, including the neutralization treatment step employed prior to the overbasing step. Furthermore, the combination of the references would not result in the presently claimed invention. Specifically, the sulfonic acid overbased in Harrison is a polyalkenylenesulfonic acid that is derived from a mixture of polyalkenes having 12 to 350 carbon atoms. The mixture of polyalkenes has greater than 20 mole alkylvinylidene. See Harrison at p. 4, lines 8013. By contrast the sulfonic acids employed in Carrick are mono- or polynuclear aromatic or cycloaliphatic compounds. In Carrick, there is no teaching that discloses that the sulfonic acid is derived from the same source as the sulfonic acid compounds employed in Harrison.

There is nothing in Harrison that suggests that the sulfonic acid compounds employed in Carrick could be used in the Harrison invention. In general, there is no motivation to combine the references. There is no teaching or suggestion that the overbasing temperature employed in Harrison could be employed in Carrick. There is nothing in the references that teaches or suggests that the combination of the two references would yield the presently claimed invention.

Furthermore, unlike the compounds of the presently claimed invention, there is nothing in Carrick or Harrison or the combination of the two references that teaches or suggests that a polyalkenyl sulfonic acid compound has been pre-treated with a neutralizing agent prior to the overbasing step.

Clearly, the Examiner has failed establish a prima facie case of obviousness. There is no likelihood of success in obtaining the presently claimed invention based upon Carrick in view of Harrison. Applicants respectfully request that the Examiner withdraw the rejection of Claim 26 as being unpatentable over Carrick,

U.S. Published Patent Application 2003/0134756, in view of Harrison,
WO01/70830.

35 U.S.C. §103(a) Rejection of Claim 27

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of Claim 27 as being unpatentable over Carrick in view of Gragson.

Applicants respectfully traverse the Examiner's rejection. In order for a patent application to be deemed unpatentable under 35 U.S.C. §103(a), the Examiner has the burden of establishing that the Applicants' invention would be obvious in view of the cited reference(s).

Specifically the Examiner has failed to consider the objective evidence present in the application, which clearly indicates that the presently claimed invention is *not* obvious and is patentable over Carrick in view of Gragson.

As presently claimed, Claim 27 is directed to a process for overbasing wherein the overbasing pressure is from about 25 to about 65 psia. The pre-treated polyalkenyl sulfonic acid is overbased at this pressure.

By contrast, Carrick does not teach a step wherein the polyalkenyl sulfonic acid product is neutralized. Paragraph [0026] specifically teaches an overbasing process that entails reacting an acidic organic compound in a reaction medium, an excess of metal base and a promoter. The acidic organic compound is defined as a sulfonic acid. Carrick merely teaches an overbasing step.

Furthermore, the Examiner admits that Carrick fails to disclose a preferred overbasing pressure. The Examiner relies upon Gragson to teach a preferred overbasing pressure.

Applicants argue that the Examiner has failed to show that Gragson cures the defects of Carrick, including the neutralization treatment step employed prior to the overbasing step. Furthermore, the combination of the references would not result in the presently claimed invention. Specifically, the sulfonic acid overbased in Gragson is a petroleum sulfonic acid. See Column 2, lines 34-36. By contrast the sulfonic acids employed in Carrick are mono- or polynuclear aromatic or cycloaliphatic compounds. In Carrick, there is no teaching that discloses that the sulfonic acid is the same sulfonic acid compound employed in Gragson.

There is nothing in Gragson that suggests that the sulfonic acid compounds employed in Carrick could be used in the Gragson invention. In general, there is no motivation to combine the references. There is no teaching or suggestion that the overbasing pressure employed in Gragson could be employed in Carrick.

Furthermore, there is nothing in the references that teaches or suggests that the combination of the two references would yield the presently claimed invention.

Unlike the compounds of the presently claimed invention, there is nothing in Carrick or Gragson or the combination of the two references that teaches or suggests that a polyalkenyl sulfonic acid compound has been pre-treated with a neutralizing agent prior to the overbasing step.

Clearly, the Examiner has failed establish a prima facie case of obviousness. There is no likelihood of success in obtaining the presently claimed invention

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based upon Carrick in view of Gragson. Applicants respectfully request that the Examiner withdraw the rejection of Claim 27 as being unpatentable over Carrick, U.S. Published Patent Application 2003/0134756, in view of Gragson, U.S. Patent No. 3,384,585

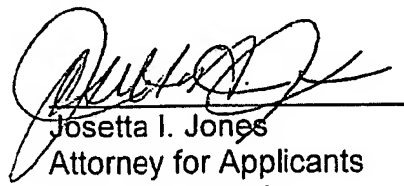
Conclusion

It is respectfully submitted that all of the rejections set forth by the Examiner, and the assertions made in support thereof, have been made as if Applicants' invention were included as part of the knowledge possessed by one skilled in the art. It is clearly impermissible, however, for the Examiner to use the hindsight of the present application in making these rejections, which it appears the Examiner has done. It is respectfully submitted that Applicants have shown that one skilled in the art at the time of the present invention, absent the teachings of the present application disclosure, would not choose only to view and consider the portions of the reference which the Examiner erroneously contends he would, thereby disregarding the other portions which are also set forth therein and which Applicants submit are equally as important to understanding the reference as a whole.

For the reasons stated, Applicants submit that this application is in condition for allowance and notice to that effect is earnestly solicited.

The Director of Patents is hereby authorized to charge any fees which maybe required, or credit any overpayment, to Deposit Account Number 03-1620 for the above-referenced patent application.

Respectfully submitted,


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JJJ:kl
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